PROFILES OF CIAT RESEARCH - 1978

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OVERVIEW

CIAT RESEARCH PROFILES - 1978

OVERVIEW

Research programs at CIAT have now reached the stage of defining their roles and directions, beginning to identify the prime target areas, and developing strategies for the expeditious realization of their objectives At present the Center's programs are 'fine tuning' individual projects, approaches and personnel - a process expected to continue indefinitely By 1979 most of the presently projected expansion will have occurred with the increase from 31 major research projects in 1976 to 55 projects in 1980/81, or an 80 percent increase for the five year period

The Center's research programs have made some major adjustments in their approaches and are beginning to perceive several urgent needs For example, augmenting the disease investigations in Beans, expanding the Phaseolus and cassava collecting, investigating nematodes on CIAT commodities, exploring non-rhizobial microbiological activities (Mychorriza spp), coordinating base data analysis, supplementing program coordinator's research responsibilities, and implementing off-site investigations and international cooperation To some extent these needs, when fully justified, will require net additions to CIAT's present staffing quota - particularly for off-site assignments In other instances there may be trade-offs for activities and projects no longer required

or which have successfully achieved their defined goals

PURPOSE OF PROFILES

The "Project Profile" is designed as a brief outline of each section or project, the basic unit of research headed by a senior-international scientist In one convenient source it provides skeletal information on the objectives, strategies, major thrusts and structural resources of each section or project assigned significant research responsibilities at CIAT

The "Profiles" does not attempt to describe individual experiments nor the separate research activities which are now listed in the "Register of Current Research Activities/Experiments" For this reason it is intended as a semi-permanent document to be revised and updated perhaps not more frequently than once a year, whereas the "Register" is inteded to be reissued each growing season

ALLOCATION OF RESOURCES

Subjective evaluations on allocation of sectional resources and efforts were obtained from the majority of the scientists in the three major programs (Table 1 and 2) These suggest a higher input of total sectional resources on research activities than estimated previously (77% vs 70% in 1977), with a compensatory decrease (5%) in consultation/international cooperation However, it is unlikely there

Table 1

Subjective Evaluation on Allocation of Sectional Resources on Major Activities at CIAT (percent of total)

Category	BEEF 1978	BEANS 1978	CASSAVA 1978	ALL CIAT 1977	ALL CIAT 1978
Research	82	77	72	70	77
Training	10	14	17	14	14
Consultation/IC	8	9	11	15	9

Table 2

Subjective Evaluations on Allocation of Sectional Efforts on Research Strategies at CIAT (percent of total)

Category	BEEF 1978	BEANS 1978	CASSAVA 1978	ALL CIAT 1977	ALL CIAT 1978
Identifying Constraints	32	12	13	25	19
Developing Methodology	8	18	9	42	12
Direct Problem Solving	40	70	78	33	63

has been any real change in outreach activities but rather, CIAT scientists may have more accurately estimate their allocation of time, efforts and resources At least there appeared to be better agreement between projects and programs than in the 1977 exercise

The 1978 evaluations on research strategies was even more interesting There was virtually a complete change from 1977 when more equivalent ratings were given to each of the three primary strategies (1) identifying and characterizing constraints = 25%, (2) developing research methdology = 42%, and (3) direct problem solving activities = 33% (Table 2) The more recent allocation estimates of 19, 12 and 63 percent, respectively, are believed to more accurately reflect the prevailing situation with considerably more stress on problem solving activities This may be partly attributable to a better definition and understanding of the categorization of research strategies, and to the programs themselves achieving a higher level of maturity However, it is also understandable that Beef is still allocating about a third of that program's efforts to identifying constraints since there is comparatively limited information on the problems of beef production on poor, acid tropical soils

ABOUT THE PROFILES

There are 50 sectional profiles included in this compendium representing 20 from Beef, 12 from Beans, 9 from Cassava and 9 from the Associated Units

A few sections are not represented as a consequence of late submission, departure of the sectional leader or because the project is new and has not yet had time to organize itself The quality and information provided in each profile varies somewhat from section to section depending on the stage of development of the project and care invested However, this is only the second attempt and every effort will be made to bring all profiles up the same high standard in future editions

1 BEEF PROGRAM

PROFILES OF CIAT RESEARCH

September 1978

TITLE Impact Area Survey – T T Cochrane

OBJECTIVES

1 To classify the land resources of lowland tropical America as a basis for CIAT's research priorities and technological interchange with particular emphasis on beef cattle production

2 To identify geographical priority areas for technological innovation through economic appraisal

STRATEGIES

1 To develop a comprehensive land classification based on the Land System concept For the Impact Area, a Land System has been defined as "an area or group of areas throughout which there is a recurring pattern of climate, landscape and soil" These environmental parameters classify in the following categorical order

A Climate
- a) Radiant energy received
- b) Temperature
- c) Potential evapotranspiration
- d) Water balance
- e) Other climatic factors

B Landscape
- f) Land-form
- g) Hydrology

C Soil
- h) Soil physical characteristics
- i) Soil fertility characteristics

2 To use satellite (ERTS and LANDSAT) and radar imagery at a scale of 1 to 1 million, as a common basis for the mapping of Land Systems

3 To develop realistic criteria for the classification of landscape and soil data

4 To develop a data bank and information retrieval and print-out system to make the findings, or any part of the findings of the survey, readily accessible to scientists and economists The system would incorporate a "map" print-out facility, and permit cross correlation of data

MAJOR THRUSTS

1 To make an initial climatic survey of the Impact Area, and computerize it in such a way that any selected data can be available independently of its cross link-up with landscape and soil data

2 To give priority to the land classification of the Ultisol and Oxisol savanna areas in the first stage of the project, to help with the development of research priorities for beef cattle production, particularly the development of reasonable criteria and priorities for grass and legume species selection and development, to be followed by land areas originally, or still covered by forests

3 Co-laterally, to ensure that enough information is being coded and processed to serve the overall needs of CIAT's research and technological development strategies (90%)

4 Economic analyses (GAN) 10%

OPERATIONS

Staffing 1 Research Assistant, Ing Luis Sanchez, 0 5 Secretary (a need for more secretarial and technical help)

Allocation of Resources

Totally research 100%
Major research activity in the field 40%
Location Impact Area
Major research activities
Classification of Land Resources of Lowland Tropical America, 90%

CIAT RESEARCH SECTION PROFILE

TITLE Beef Program Coordinator - P Sanchez (Soil Scientist)

OBJECTIVES

To develop soil management technology for overcoming specific factors limiting increases in tropical pasture production in Oxisols and Ultisols

STRATEGIES

1 Identify constraints to increasing pastures/production in the target area which are not under study by other team members
2 Quantify the main practices for supplying nitrogen to tropical pastures
3 Study pasture establishment methods through annual crops
4 Contribute to studies related to management of soil acidity and phosphorus as a supplement of that undertaken by other sections of the Program

RESEARCH ACTIVITIES

I Identify research gaps on soil-plant-animal relationships in the impact area of the Program (10% of activities)

1 Reconnaisance travel, literature and communications
2 Integration of experimental activities with other members of the Beef Program

II Nitrogen fertilization vs fixation by legumes (30% of activities)

1 At Carimagua, with 1, 2 and 3-year old Brachiaria pastures
2 At Santander with Andropogon, Brachiaria and Panicum

III Using cropping systems as means of pasture establishment (30% of activities)

1 At Carimagua three cropping systems, eight fertility levels
2 At Santander 20 cropping systems, two fertility levels
3 At Brasilia using 2-year cropping systems with 15 phosphorus management treatments to be followed by pasture establishment (through Jot Smith, NCSU graduate student)

IV 1 At Santander Sources of Phosphorus experiment with A Leon

OPERATIONS

Staffing 1 Research Assistant, 2 Secretaries, 2 Technicians, 4 laborers

Allocation of Resources

- Primarily administration = 90%
- Major research activities are in the field (80%)
- Location Primarily at Santander de Quilichao (50%)
- Personal travel = 27% of time
- Major research activities
  - Nitrogen fertilization vs fixation by legumes 30%
  - Using cropping systems as means of pasture establishment 30%

CIAT RESEARCH SECTION PROFILE

TITLE SOIL AND PLANT NUTRITION

J G Salinas

OBJECTIVES To study and develop fertilization packages for the program's targe area, with special attention towards critical nutrient requirements for grasses and legumes with emphasis in a minumum input strategy for fertilizers based in differential response among species To provide a basic fertilization for the regional trials into the impact area

STRATEGIES

1 Analysis and evaluation of the new plant material from the Germplasm bank in terms of mineral deficiencies and toxicities in order to select the most promising lines

2 To study under experimental conditions the critical nutrient requirements for the most primising lines in order to develop a basic fertilization with a low input strategy according to the efficient use of the available nutrients by species

3 Integrate the section with the Program in the sense of fertilize requirements for field experiments at Carimagua, Quilichao and Regional Trials

MAJOR THRUSTS

1 To screen potential plant material in a wide range of grasses and legumes for adaptation to acid soil conditions

2 To determine critical nutrient requirements under greenhouse conditions (CIAT-Palmira) using Carimagua soil Macro and micronutrients as well as Al and Mn toxicities are involved in the studies This type of studies concerns the establishment period

3 Verification of the technology under field conditions with the best promising lines (Carimagua, Quilichao and Regional Trials)

4 To develop the basic fertilization approach to recommend for optimum forage production Adjustment of critical nutrient requirements through correlation among greenhouse and field studies

OPERATIONS.

Staffing Research Assistants (2), Technicians (1), Field Assistants (1), Labor helpers (10), Secretary (0 5)

Resource Allocation

Capital and administration Budget $14,300 - 1978

Land (not inc permanent labor) 11 ha , Carimagua and Quilichao

Facilities Greenhouse, Laboratory, officies

PROFILES OF CIAT RESEARCH
JULY 1978

TITLE Phosphorus Project - W F Fenster & L A León

OBJECTIVES

1 To evaluate the effectiveness of sources and methods of application of phosphate fertilizers on phosphorus deficient soils of tropical and subtropical Latin America

2 To determine the forms and availability of the reaction products of these fertilizers in soils as relates to their initial and residual effectiveness

3 To establish criteria for applying the results of the first two objectives to different soils and crops at various locations by conducting field experiments on selected soils throughout Latin America

STRATEGIES

1 Identify soils and field experimental sites which best represent the major phosphorus deficient areas in Latin America

2 Identify,through laboratory, incubation and greenhouse studies, the forms of phosphorus fertilizers which give the highest economic crop yields in Latin America

3 Identify a phosphorus soil test(s) that will predict plant response to the various phosphate carriers used in Latin America

MAJOR THRUSTS

1 To establish greenhouse and field experiments on representative soils of Latin America, such that an overall phosphorus management strategy for crops can be ascertained

2 To develop a meaningful phosphorus soil test, through calibration and correlation studies, for the representative

soils and crops of Latin America

3 To make realistic phosphorus fertilizer recommendations for a wide variety of crops in Latin America These recommendations will reflect the phosphorus carrier as well as the crop to be grown

OPERATIONS

1 Staffing

Research Assistants	3
Lab Technician	1
Research Trainees	2
Lab Assistants	1
Secretary	1
Workers	6

2 Resource Allocation (1978) US$ 232,000

Note This is a grant from IDRC through IFDC and represents all costs of the project both at CIAT and IFDC

3. Land (approx)

Quilichao	2 - 3 ha
Popayán	0 5 ha
Carimagua	2 - 3 ha
La Libertad	2 - 3 ha
Outside Colombia	10 ha

FACILITIES

Soil Chemistry Lab	1
Offices	4
Greenhouse section	0 5
Screenhouse section	0 2
Storage unit - CIAT	1
Carimagua	1

CIAT RESEARCH SECTION PROFILE

TITLE Plant Exploration Agronomy - R Schultze-Kraft (temporary)

OBJECTIVES To augment and broaden the genetic diversity of tropical forage germplasm with potential for the poor, acid, oxisols and ultisols of the lowland tropics of Latin America

STRATEGIES
1. Assembling of germplasm through direct collection and exchange with other workers
2. Initial increase, maintenance and supply of germplasm to Beef Program Scientists for evaluation, screening and genetic improvement
3. Preliminary evaluation for future potential and possible economic use
4. Identification and classification of germplasm, and maintaining a reference herbarium
5. Ecological studies of native savannah vegetation of target areas

MAJOR THRUSTS

I Assembling and collecting tropical forage germplasm (40% of activities)
- 1 Priority given to legumes with forage potential in the lowland, allic soil tropics of Latin America
- 2 Grasses assembling and exchanging germplasm through correspondence and visitation
  - Tropical Africa, Asia and Australia
  - Southern Asia, India, others
  - Latin America 2 or 3 major genera

II Increase/Maintenance/Evaluation of collection (50%)
- 1 Carried out in the CIAT Greenhouses and at Santander - 3 ha
- 2 Maintain seeds and vegetative materials for storage/screening
- 3 Evaluation morphology vigor, palatability, persistence, maturation, pest/disease reaction, seed and dry matter production

III Identification and Classification of Germplasm (5%)

IV Ecological Studies of Native Savannah Vegetation (5%)
- 1 Survey of vegetation - starting in the L'anos and in plant communities

(R Schultze-Kraft)

- Soils, topography, moisture, temperature and season effects
- Effects grazing management and burning

2 Classifying, describing and preparing herbarium specimens

OPERATIONS

Staffing 2 Res Assit , 0 5 Secretary, 3 Field Asst , 4 laborers

Allocation of Resources

- Primarily Research (90%)
- Major research done in the field (60%)
- Location Primarily in Palmira
- Major research activities
  Increase/Maintenance/Evaluation of collections (50%)
  Assembling and collecting tropical forage germplasm (40%)
- Travel 40%

Land use

Santander 3 ha

CIAT RESEARCH SECTION PROFILE

TITLE Pasture (Legume) Agronomist – R Schultze-Kraft

OBJECTIVES To improve and develop legume-based pastures for the low-fertility oxisols and ultisols of tropical Latin America

STRATEGIES
1 Characterize the major constraints of forage legumes and grasses for the poor allic savannahs of tropical Latin America
2 Carry out adaptation studies on new forage collections and introductions
3 Select and evaluate promising forages through observation nurseries, clipping and preliminary grazing trials on soils typical of the target area

MAJOR THRUSTS

I Adaptation of forage introductions (15%)
1 Propagation in pot-culture
2 Space-planted observation nurseries

II Advanced clipping trials (5 x 10 m plots) of most promising materials, primarily as mixtures with standard grasses (Andropogon, Brachiaria, Melinis, Hyparrhenia) about 15–20 strains
1 Santander 3–5 ha
2 Carimagua 1–2 ha

III Grazing evaluation of most promising materials from above trials – about 4 or 5 varieties
1 Santander 5–10 ha
2 Carimagua 12 ha
Note Sequence of steps requires about 3 years

IV Investigations and Propagations of Basic Genetic Stocks at Palmira (15% – Greenhouse and Palmira 2 ha)
1 Preliminary propagation, evaluation and seed maintenance
2 Fertile soil evaluations and seed increases

OPERATIONS Staffing 2 Research Assistants, 0 5 secretary, 3 technicians, 10 laborers

Allocation of Resources
- Primarily research = 75%
- Major research activities are in the field (75%)
- Location Primarily at Santander (70%)

(R Schultze-Kraft)

- Major research activities
  Advanced clipping trials of most promising materials (30%)
  Grazing evaluation of most promising materials (30%)

Land use

Santander	17 ha
Carimagua	14 ha
Palmira	2 ha

PROFILES OF CIAT RESEARCH

Title Grass Agronomy - C A Jones

Objectives To identify grass germplasm which is adapted to and productive in the edaphic, climatic, and biological environment of the Beef Team Target Area and which is compatible with the management and economic constraints encountered there

Strategies

I Determine the severity of environmental and management constraints limiting the yield and quality of grasses in Carimagua and Santander de Quilichao

II Determine the reaction of promising grass accessions to the major environmental and management constraints

III Develop and verify a general plant growth model which quantifies the effects of major environmental constraints in specific accessions and use the model to predict genotype reaction to different combinations of environmental constraints found in the Target Area

Major Thrusts

I Determine (quantitatively) the response of adapted accessions to environmental constraints such as drought stress, soil saturation, inundation, low soil P, low soil N, and legume-weed competition

II Evaluate promising introductions under grazing and in association with legumes at Carimagua and Santander de Quilichao

III Select populations of Andropogon gayanus for specific morphological and phenological characters in order to determine the effect of these characters on quality and compatibility with legumes

IV Determine the importance of competition for light and for phosphorus in a standard grass-legume association

V Develop and verify the general plant growth model to be used in predicting genotype reaction to different combinations of environmental constraints found in the Target Area

Operations

Staffing	Palmira	Secretary (0 5)
	Quilichao	Research Assistant (1), Tecnico (1), obreros (3)
	Carimagua	Research Assistant (1), Obreros (3)
Budget	$15 302 (1978) (not including permanent labor)	
Land	Carimagua	Approx 3 - 4 ha
	Quilichao	Approx 3 - 4 ha

EMBRAPA
EMPRESA BRASILEIRA DE PESQUISA AGROPECUARIA
CENTRO DE PESQUISA AGROPECUARIA DOS CERRADOS

PROFILES OF CIAT RESEARCH

TITLE
Forage Agronomy D Thomas

OBJECTIVES
To biologically and agronomically evaluate new grass and legume germplasm for adaption and persistence under grazing on the acid infertile soils of the cerrado of Brazil To investigate the potential for pasture seed production within this target area

STRATEGIES

I To identify suitable legumes and grasses that will grow and persist in the acid infertile soils of the target area

II To evaluate combinations of promising grasses and legumes under grazing and to measure levels of animal production

III To investigate the potential for pasture seed production in the target area and produce seed of grasses and legumes identified as promising

MAJOR THRUSTS

I The biological evaluation (STAGE I) of new germplasm of grasses and legumes To examine their capacity to grow and persist in the soil-climate environment of the target area and their resistance to pests and diseases

EMBRAPA - CPAC

II The agronomic evaluation (STAGE II) of promising grass-legume combinations chosen from STAGE I Measurement of productivity and persistence under grazing

III The measurement of animal production (STAGE III) from promising grass-legume combinations chosen from STAGE II

IV To produce seed of promising grasses and legumes within the target area To measure time of flowering and seed maturation, seed yield, pest and disease constraints to production

OPERATIONS

Staffing Brazilian counterpart (1), Technical Assistant (1), Labourers (4), Secretary (0 3)

Resource allocation Budget (UNDP) US$10,750 (1978)

Land approximately 8 ha at CPAC, Brasília, Brasil

Facilities half of one office and one small seed store

CIAT RESEARCH PROFILE

TITLE PASTURES DE/ELOPMENT AND MAINTENANCE

J M SPAIN

I OBJECTIVES

1 To develop efficient and economic systems of establishing pasture legumes and grasses appropriate for representative ecosystems in the target area

2 To determine maintenance requirements of most promising grass and grass-legume pastures for the area

II STRATEGIES

1 Collect and interpret edaphic and climatic data relevant to pasture establishment problems in representative ecosystems of the target area

2 Develop efficient and economic systems for pasture establishment in representative ecosystems with emphasis on minimum inputs and reduced erosion hazard

3 Determine maintenance requirements of selected promising grass-legume associations under Carimagua conditions To study methods of renovation of degraded pastures

III MAJOR THRUSTS

1 Edaphic and climatic data collection and analysis

a) Soil physical properties
b) Rainfall distribution, probabilities
c) Other climatic factors

2 Seed bed preparation and control of competing vegetation

a) Most efficient methods of producing favorable physical environment for establishment
b) Economic methods of controlling competing vegetation, including use of herbicides
c) Control of erosion during establishment phase

3 Establishment of adequate stands

a) Methods of planting, row vs broadcast, spatial distribution of legumes and grasses
b) Soil compaction
c) Use of mulch
d) Time of planting, legumes vs grasses and through the year
e) Special seed preparation pelleting with fertilizers, rhizobium

4 Low density seeding methods

a) Optimum density of "mother" plants with conventional seed bed preparation
b) Interaction of seeding density, seed bed preparation fertilization and species
c) Effect of stage of growth and degree of control of native vegetation on establishment of seeded species

5 Pasture maintenance (with J Salinas)

a) Nutrient requirements, methods and times of application
b) Tillage for renovation
c) Interaction of fertility x associations
d) Spatial distribution of legumes with aggressive-sod forming grasses for persistence

IV OPERATIONS (All at Carimagua)

Staffing Research Associate (1), Research Assistance (1), Field Assistant (1), Laborers (10) Secretary (0 5) (Note Field Assistant and Laborers are ICA employees)

Budget $17,534 not including permanent personnel costs

Land ± 10 ha

Facilities Office space 24 m^2, Field laboratory 50 m^2

EMBRAPA
EMPRESA BRASILEIPA DE PESQUISA AGROPECUARIA
CENTRO DE PESQUISA AGROPECUARIA DOS CERRADOS

PROFILES OF CIAT RESEARCH
September 1978

TITLE
Pasture Development (Cerrado) - Walter Couto

OBJECTIVES
To study soil nutrient deficiencies which limit pasture stablisment, productivity and persistance and develop fertilizer use recomendations for stablishment and maintenance To develop sound technology for pasture stablishment applicable to distinct conditions of soil use and potential in different areas of tropical savannas

STRATEGIES

I Identification of major soil nutrient constrains for optimum plant growth in main soils of the area, using most promising plants

II Estimation of optimum levels of fertilizers necessaries to overcome these deficiencies and ensure proper stablishment and persistance of sown plants within the pasture

III Development of pasture stablishment methods sutable for varying conditions of soil use and input levels Methods include native pasture improvement through legume introduction, pasture stablishment in association with crops and cultivated grass-legume associations

MAJOR THRUSTS

I Greenhouse experiments with two legumes representing low and high nutrient requirements in two major soils of the cerrado Field experiments concerning those nutrients identified as limiting for legumes of interest in the region, oriented to check greenhouse findings and estimation of requiered levels of nutrients

II Field experiments with levels and sources of phosphate designed to estimate most convenient levels and sources of phosphorous once other nutrient dificiencies have been corrected Requirements are estimated for both establishment and maintenance needs for cultivated pasture and improved native pasture

III Legume introduction to native pasture to improve feed value and better utilization throughout the dry season

OPERATIONS

I Staffing Three research associates (EMBRAPA's counterparts) belonging to three diferent projects of CPAC research plan inventory of resources (native pasture ecologist), use of resources (soil fertility specialist) and production systems (pastures and animal nutrition specialist)

II Staffing Two tecnicians and four workers with responsabilities in all other CPAC pasture experiments (All personnel is assigned to pasture and fodder trops section and not specifically to a given part of it at CPAC)

III Staffing One tecnician and two workers with responsabilities in all other greenhouse experiments

Land/Facilities Experimental fields, (3-4 has) greenhouse and laboratories, areas of native pastures assigned to the section (supplied by CPAC)

Resource Allocation Budget US$12,753 00 (1978)

PROFILES OF CIAT RESEARCH

July 1978

JOHN E FERGUSON

TITLE Forage Seed Production Technology

OBJECTIVES The supply of seed for experimental purposes and of foundation seed of new cultivars

The provision of technology towards constraints to commercial seed production

STRATEGIES

1 To produce seed of promising legume and grass accessions for the needs of the Beef Production Program

2 To produce foundation seed of new cultivars for distribution to collaborators

3 To develop production technology and production systems for high priority species

4 To define appropriate geographic regions for seed production

MAJOR THRUSTS

1 Rapid increase of seed of promising accessions within CIAT

2 Production of foundation seed in collaboration with appropriate national institutions

3 Definition of appropriate production technologies i e the influence of various cultural practices, alternative harvest methodology and post harvest management on seed yield and quality

4 Definition of relative production potentials in different geographic regions

5 Provision of production orientated training to selected trainees

OPERATIONS

1	Staffing	Research Associate, 1 Research Assistants, 2 Technicos, 8 Labourers, 11 Secretary, 0 5
2	Recource Allocation	US$18,000 in 1978
3	Land	CIAT Palmira 3 0 ha, CIAT Quilichao 13 0 ha, ICA-CIAT Carimagua 5 0
4	Facilities	Seed handling area 20x10 m^2, Seed harvesting processing equipment Seed laboratory (shared) 6x5 m^2, Office 6x5 Storeroom 6x5 m^2

frb

PROFILES OF CIAT RESEARCH

Tittle — Tropical Forage Breeding

E M HUTTON

Objectives — Adaptation by breeding of Stylosanthes capitata, Leucaena leucocephala, Centrosema pubescens, and Panicum maximum to the oxisols, ultisols and other infertile soils of tropical Latin America

Strategies

I — Identify the characters required in these and other species by continual examination in various environments of introduction, evaluation, and animal production investigations

II — Select key introductions of the above species In the case of legumes, intercross all key introductions to give at least a half-diallel series The most important tropical grasses are apomictic, so location of sexual material to develop large and variable populations is essential

III — Investigate chromosome numbers and breeding systems in the selected intioductions of the above species and any other potentially promising species

IV — All bred lines finally selected to have wide adaptability to soil type and to pHs of 4 2 to 6 5 or higher

Major Thrusts

I At Quilichao large F_2 populations of all legume crosses as single plants, oversown with a suitable grass (P maximum or Andropogon gayanus) to be rated and periodically grazed This will apply particularly to S capitata and possibly C pubescens

II At Palmira, the C S I R O L leucocephala - L pulverulenta material, glasshouse selected in Carimagua oxisol is planted in the field for comparative studies of edible forage production, mimosine levels, chromosome numbers, pollination and seed production

III At Palmira, large seedling populations of Leucaena selections and F_2 Centrosema pubescens to be selected in controlled sand culture for tolerance to low pH (4 2) and high Al (10 ppm) Promising selections to be grown with periodic grazing at Quilichao and probably Carimagua and Brasilia in cooperation with legume agronomists

IV At Palmira, sexual P maximum material from Georgia grown in the field and crossed with the most promising types from Quilichao Large and variable seedling populations to be screened (1) for drought tolerance in cooperations with Dr. A Jones at Quilichao (2) for tolerance to acid conditions in glasshouse sand culture at Palmira The most promising fixed apomicts to be oversown with a common legume (S capitata or C pubescens) and evaluated under periodic grazing at Quilichao and probably Carimagua and Brasilia

Operations	Staffing	Research Assistants (2), Field Assistant (1), Obrero (1), Secretary (0 5)
	Resource allocation	Budget 1978 - legumes $12 833, grasses $6.390
	Land	Approx 1 ha CIAT, 1 ha Quilichao
	Facilities	Some space in glasshouse and invernadero

CIAT RESEARCH SECTION PROFILE

TITLE Diseases of Tropical Forages
Jillian M Lenné

OBJECTIVES To detect, identify and assess diseases of tropical forages and to evaluate control measures

STRATEGIES

1 To evaluate the effect of anthracnose on tropical forages and to develop reliable standard procedures for screening

2 To detect and identify other diseases of tropical forages, to evaluate their importance and to develop control measures where necessary

MAJOR THPUSTS

1 To survey and assess new germplasm under primary evaluation with respect to disease

2 To survey and assess established germplasm under secondary and further evaluation with respect to disease

3 To screen promising forage accessions against as many different isolates of *Colletotrichum* species from as many different locations and hosts as possible, to determine the genetics of the host-pathogen relationship and to initate any necessary breeding programs for anthracnose control

4 To develop and evaluate long and short term control measures relevant to the diseases involved, the environments encountered and the management practices of the target area of the Beef Program

OPERATIONS Staffing

Research Assitants (1), Technicians (1)
Labour Helpers (2), Secretary (0 5)

Resource allocation

Budget (not incl permanent labour) $8616 1978

CIAT RESEARCH SECTION PROFILE

TITLE

Forage Entomologist (PDF) - Mario Calderón
Beef Program

OBJECTIVES

To develop a pest management program for tropical forages of the Beef Program impact area minimizing chemical controls

STRATEGIES

1 Identify and evaluate the economic pests of tropical forages in the Beef Program impact area
2 Determine the economic thresholds of insect damage to tropical forages
3 Organize all the components of a rational pest management program for tropical forages

MAJOR THRUSTS

I Identify Economic Insect Pest of Tropical Forages (60% of activities)

1 Review of literature and reconnaisance surveys
- Taxonomic placement due to the actual confusion on nomenclature of Stylosanthes stemborer
- Coleophora sp (Coleophoridae family) or Zaratha sp (Blastodacnidae family)
- Stylo budworm (Stegasta bosqueella) (Gellechiidae family) Primary deterrent to seed production
- Spittle bug of Brachiaria (Aeneolamia sp - Cercopidae family)
- Sucking pest of developing Brachiaria seeds (probably Cicadellidae family)
- Ants a major problem in pasture stablishment

2 Studies of life cycles of the most important pests, population dynamics of the insect beneficials present

3 Study of the stemborer distribution over the impact area in Colombia (Llanos)

4 Develop a screening system for the new plant introduction of the Germplasm bank

5 Preliminary evaluations on spidermites, aphids, and trips on new plant material - new accessions

II Determine Economic Thresholds of Insect Damage

1 Stemborer infestation intensity and damage at Santander and Carimagua

- Formula developed as ratio between numbers of stem with damage over total stems (x 100) to be correlated with productivity
- Infestation intensity applied to a scale for damage assessment based on dividing plant into thirds
- Objective is to develop techniques for field evaluation of damage (to be used by Trainees)

2 Develop a strategy for pest management based on these studies

III Components of Pest Management (preliminary)

1 Evaluation of "pest-free" or "less damaged" forage strains

- eg S capitata is actually showing less damage of stemborer

2 Searching for predators, parasites and pathogens, to be included as a components of an integrated forage pest control

OPERATIONS

Staffing 1 Technician, 2 Laborers, 1 Research Assistant at Carimagua (60% Entomology, 40% Seed Production)

Resource Allocations

- Primarily Research (95%)
- Major research activities are in the field (90%)
- Location Santander (50%), Carimagua (50%)
- Personal Travel (10%)
- Major research activities Identify Economic Insect Pests of Tropical Forages.

Land/Facilities

- Research plots at Quilichao and Carimagua
- Screenhouse and Glasshouse required to organize the work facilities in CIAT-Palmira

PROFILES OF CIAT RESEARCH

September, 1978

Title Animal Health - E Aycardi

OBJECTIVES

To study and develop animal health preventive medicine schemes adjusted to CIAT animal production packages for the Program's Target Area To monitor health problems in experimental herds and collaborating ranches, specially related to the improvement of nutrition

STRATEGIES

I Evaluation of preventive medicine schemes in the target area

II Survey of disease prevalence with respect to nutritional and management conditions

III Monitoring of the Program's Experimental and Test Herds, selected farms and findings of collaborators in the area of impact

MAJOR THRUSTS

I Evaluation and development of preventive medicine schemes to include in beef program production packages Implementation of health practices, field and laboratory in experimental beef herds

II Monitoring of health problems at different levels Experimental herds, Test herds, selected farms within priority areas and through surveys in the impact area with collaborators Characterize existing and potential animal health problems

III Determining the implications of specific conditions related to different nutritional levels Study of systems to control Leptospirosis in the presence of uniform nutrition Study of systems to control internal and external parasitisms Study of conditions affecting calf mortality

OPERATIONS

Staffing Research Associate (1) Research Assistants (1 Carimagua, 1 Palmira), Technicians (9), Labor (2), Secretary (0 5)

Resource Allocation Budget (not inc Permanent labor) $23 200 (1978)

Land/Facilities 800 ha y 100 breeding cows (Carimagua) 2 corrals, handling facilities and 16 breeding cows (Palmira)

Laboratory facilities (50 m^2)

PROFILES OF CIAT RESEARCH

June 1978

Title Animal Management - I. Kleinheisterkamp

OBJECTIVES To study and develop improved beef production technology packages for the program's target area, with special attention towards cow-calf operation and with emphasis on feed utilization To evaluate new pasture germplasm within production systems To provide service functions to the program in terms of animal management

STRATEGIES

I Analysis and evaluation of prevailing beef production systems within priority regions of the target area To study the relations between technology, intensity and productivity levels. Determination of demand of technology and possibilities of adoption

II To study under experimental conditions the effects of single components of herd management on animal performance, particularly as related to pasture utilization

III Management of the Program's test herd

MAJOR THRUSTS

I Technical-economical (jointly with the Economic Section) evaluation of prevailing production system (ETES Project) Monitoring of selected farms within priority area Study of herd performance, particularly reproductive performance, and animal output in relation to technological inputs

II Breeding Herds Management Systems (Carimagua) study of reproductive performance of breeding herds, in relation to

- Pasture utilization native savanna vs strategic use of improved pastures New plant material is being tested
- Restricted mating seasons, to syncronize critical periods to seasons of better feed availability
- Age at weaning

III. Production of suitable animals for grazing experiments (Carimagua) under commercial (low inputs) conditions

OPERATIONS

I. Staffing 2 Research Associates (Visiting specialists, special project), 1 Research Associate (Core), 1 Technician

Resource allocation 50% of budget (not including permanent labor), US$ 15 250 (1978)

Land/Facilities None (selected farms)

II. Staffing 1 Research Assistant, 3 cowboys

Resource allocation 50% of budget

Land/Facilities 2 500 ha (Carimagua), 300 breeding cows, handling facilities Administration Carimagua

III Staffing 1 Research Assistant (ICA), 4 cowboys

Resource allocation capital and administration budget ICA-CIAT (50%-50%) Carimagua

Land/Facilities 5 400 ha, 331 breeding cows, 427 head young stocks, handling facilities

EMBRAPA
EMPRESA BRASILEIRA DE PESQUISA AGROPECUARIA
CENTRO DE PESQUISA AGROPECUARIA DOS CERRADOS

PROFILES OF CIAT RESEARCH

TITLE

Animal Management & Forage Utilization C Patrick Moore

OBJECTIVES

To study cow herd management techniques which would allow maximum expression of the herds reproductive and productive capability within the cerrado environment To evaluate the productivity and strategic use of improved pastures for cow/calf production systems in the infertile savannas of Latin America

STRATEGIES

I To indentify the optimum breeding management for maximum utilization of the natural environment

II To determine the best age of weaning calves for maximum effect on the cow with minimum calf growth retardation

III To submit promising pasture species to various grazing regimes to evaluate their productivity and persistence

IV To test the strategic utilization of improved pastures during certain stages of the beef production cycle and/or during certain season of the year

MAJOR THRUSTS

I To study the best season of the year for mating cows as well as the duration of the mating season by comparing matings at different times of the year and varying the length of the mating season

II To indentify the optimum calf weaning age as related to increasing cow fertility and promoting calf growth up to puberty

III Evaluation of promissory grass/legume mixtures under various levels of grazing pressure and management throughoutthe year

IV To determine the reproductive response of cows to improved pastures by strategic utilization during the reproductive cycle

V To determine tne strategic use of improved pastures for the development of females from weaning to puberty

OPERATIONS

Brazilian Counterpart	1
Research Assistants	0
Technician	1*
Workers	2*
Secretary	0 3

* Not directly assigned to staff but based on pooled average

Resource Allocation - US$17,131 00 (1978)

Land (cerrado center)

Forage utilization	10 ha
Beef cow management	750 ha

Facilities

Office - 0 5

Corral - 1

PROFILES OF CIAT RESEARCH

June 1978

Title Pasture Utilization O Paladines

Objectives

To participate in selecting species and genotypes of tropical forages with higher nutritional value and to develop pasture management strategies for better animal utilization of tropical forages in the poor, acid ultisols and oxisols in Latin America

Strategies

1 - Determination of the *in vivo* digestibility and intake of promising germplasm material

2 - Determination of the effects of grazing management on plant productivity and survival

3 - Evaluate the animal production potential of selected advanced forage genotypes

Major Thrusts

1 - Determination of the *in vivo* digestibility and intake of selected materials and determination of the selectivity excerted by sheep of plant parts as indicatives of the nutritional value of this materials

2 - Determination of the effects of grazing management factors such as grazing pressure, rest period, and level of fertility on the survival and productivity of plants in legume grass association of selected germplasm

3.- Determination of the animal productivity of selected material under determined grazing management and stocking rates, for the final selection of advanced genotypes

4 - Identification of pasture management systems which will maximize production over time promoting persistance of the selected genotypes in the mixtures

Operations

Staffing 2 Research Assistants, 5 Technicians, 6 laborers, 0 5 Secretary

Resource allocation 1978 Budget US$23,200 not including permanent staff

Land Quilichao approx 10 ha

Carimagua approx 725 ha

Facilities Metabolism Unit at Quilichao

Field Shead-Laboratory at Carimagua

PROFILES OF CIAT RESEARCH

Title Beef Economics G A Nores

OBJECTIVES

To contribute to the design, development and evaluation of new technology and technology components that could solve the main biological restraints to increased beef production in the acid infertile soils of Tropical Latin America, by explicitly taking into account the economic restrictions external and internal to the farm so as to enhance probabilities of adoption by a wide base of producers and regions and minimize social cost

STRATEGY

I Identify, anticipate and evaluate economic restrictions, external to the farm, which would directly or indirectly prevent or delay the successful introduction of new technology for beef production in the different regions of the "impact area"

II Given the major biological and economic restraints, and the trends in input-output prices, identify the nature and characteristics of the existing (and future?) DEMAND for technology in the different subregions of the "impact area", in terms of economically viable production systems

III Evaluate the expected (ex-ante) and actual (ex-post) profitability and risk associated with alternative production systems and system components (i e improved pastures, practices, input use,) at the farm level for few selected subregions

IV Anticipite and evaluate the possible impact of alternative new technological packages in terms of economic gains and its distribution among producers and consumers for few selected subregions

MAJOR THRUSTS

I Stratification of the "impact area" in an economic geography sense, by overlapping over the "land systems", identified in the "Impact Area Survey", iso-curves of input-output prices, in order to identify economic restraints, external to the farm, that would condition the economic viability of alternative biological solutions (systems and system components) in each particular subregion (conducted in collaboration with other sections of the program)

II Technical-economic evaluation of prevailing production systems, monitoring selected farms within priority areas in order to more precisely identify biological restraints and the economic payoff of possible alternative solutions given the economic restrictions internal and external to the farm (LTTS project conducted jointly with the Animal Management Section)

III Marginal economic evaluation of grazing experiments conducted by other sections of the program, and of establishment methods and pasture treatments using results of herd systems experiments and of prevailing production systems as a basis for comparison

IV Development of a validable simulation model to predict expected long-term performance of breeding herds based on short-term steer grazing experiments, so as to obtain estimates of input-output coefficients for breeding herds grazing different pastures (in collaboration with other sections of the program)

V Ex-ante evaluation of the possible impact of an increase in beef production due to technological change, in terms of economic gains and its distribution among consumers and producers Study beef consumption and estimate income elasticities of demand per income strata in 12 urban areas of six countries of Tropical Latin America (based on ECIEL survey coordinated by Brookings Institution)

VI Coordination of Collaborative Network in Livestock Economics (Ford Foundation Grant)

OPERATIONS

I Staffing Post-Doctoral Fellow (1), Research Associates (2), Visiting Research Associate (1), Research Assistant (1), Technician (1), Survey Assistant (1), Secretary (1), and support in computer software for data processing and analysis

Resource Allocations Core Budget US$7 835 00 (1978)
Land none
Facilities Office space only

CIAT RESEARCH SECTION PROFILE

TITLE Training/Reginal Trials - L E Tergas

OBJECTIVES To integrate Beef research and training, and develop a network of scientists participating in regional research in the Latin American acid soils lowland tropics

STRATEGIES
1 Training of scientists in the methodology of research at CIAT
2 Developing an international network for evaluating tropical forages as a follow-up for training

MAJOR THRUSTS

I Training of Scientists (50% of activities)
1 Identify countries and institutions for collaborative training
2 Contact and select trainees for CIAT training program
3 Travel involves
- Information on regional trials
Network I evaluation of forage species for adaptation
Network II forage response to grazing (selected forages)
- Evaluate needs for training
Attempt to identify candidates
Discuss training June-December, 1978
February-June, 1979

II International Network for Evaluating Tropical Forages (50%)
1 Evaluate adaptation of forage species under different levels of soil fertility Under common grazing (mobgrazing)
2 Evaluate adaptation of forage species under different levels of soil fertility
3 Regional trials Evaluate adaptation of germplasm material selected by CIAT - 10-15 legumes and 3 grass ecotypes

OPERATIONS Staffing 1 research associate, 1 research assistant, 1 secretary, 1 temporary laborer

(L E Tergas)

Allocation of Resources

- Primarily training and outreach (40 - 40%)
- Major research done in the field (75%)
- Location primarily Quilichao (60%)
- Major research activities
  - 50% training of scientists
  - 50% International Network for Evaluating Tropical Forages
- Travel 50%

Land Use

Quilichao 5 2 ha

2 BEAN PROGRAM

CIAT RESEARCH SECTION PROFILE

Title

Bean Agronomy - Preliminary Yield Trials
Michael Thung

Objectives

To accelerate the transfer of CIAT technology and advanced breeding materials with pest and disease resistances to the national program

Strategies

1 To compile all technology produced at CIAT experimental stations such as in cultural practices, physiology, phytopathology, entomology, soil fertility and concised it to produce technology packages
2 To develop the methodology for yield testing of the advanced breeding materials
3 To develop the methodology for screenings to high aluminum and manganese toxicity and to low soi phosphorus
4 To recommend the breeders the best material screened, so they can incorporate the characters into their breeding program

Major Thrusts

1 Preliminary yield testing of the advanced breeding materials, Germplasm bank and promisory lines
2 To screen the progenitor and advanced breeding material to high aluminum and manganese toxicity on problem soils
3 To screen the progenitor and advanced breeding material to low soil phosphorus on problem soils
4 To verify the technology packages on small farm trials with ICA in southern Huila

Operations

Staffing

Research assistants (2), Technician (1), Field assistant (1), Labor helper (3), Secretary (0 5)

Resource allocation Budget (not incl permanent labor)$12 602 (1978)

CIAT Palmira - 4 ha (50%)

Popayán - 3 ha (25%)

CIAT Santander de Quilichao - (20%)

Southern Huila - (5%)

CIAT RESEARCH SECTION PROFILE

Title Bush Bean Breeding I

S R TEMPLE

October 1978

OBJECTIVES

To genetically improve the adaptation and productivity of Phaseolus vulgaris bush types for the tropics and subtropics, and (specifically) increase resistance to Empoasca, Xanthomonas, and Bean Golden Mosaic Virus, in Latin America

STRATEGIES

1 Assessment of bean production problems in major growing regions of the target area

2 Cooperate with the indicated disciplines and respective scientists to evaluate parents, select progenies, and develop screening methods to overcome genetic deficiencies of the species

3 With other program scientists, evaluate progenies to identify materials with high yield potential, and wide adaptation

4 Train agronomist-breeders capable of identifying and moving forward materials which satisfy local environmental and grain type requirements

ACTIVITIES

I Mainstream Breeding

1 Evaluation of germplasm from CIAT bank and introductions from national and international programs

2 Management of CIAT crossing facility (screenhouse) for bulk of mainstream and special project crosses for Davis, Singh, and Temple

3 Early generation inoculation and screening for BCMV and Rust, in collaboration with Schwartz + Morales F2 and progeny test nurseries of mainstream program for lower and intermediate elevations

4 Preparation and management of Bean Team Trial (VEF)

5 Backup nursery at La Selva for Highland evaluations (currently undefined)

II Special Projects

1 Germplasm evaluation with H F Schwartz (X phaseoli) and G Gálvez (Mustia and BGMV), of inoculated nurseries

2 Inheritance studies (nearly completed) and ongoing recurrent selection program for increased resistance to Empoasca (cooperatively with entomology and A Schoonhoven)

3 Recurrent selection for increased resistance to X phaseoli (cooperatively with H Schwartz)

4 Recurrent selection for increased resistance to BGMV (cooperatively with G Gálvez and national programs)

5 Selection/crossing for increased resistance to Web blight (G Gálvez in charge)

6 Selection/crossing for increased resistance to Apion godmani (A Schoonhoven in charge)

7 Increasing levels of simbiotic Nitrogen fixation (P Graham in charge)

8 Conclusion of study initiated by R Swindell on relationship between competitive ability and yield potential in crosses among and within growth habit groups (Value of alternative breeding methods)

9 Modest effort in collaborative studies with D Mok (O S U) on developmental abnormalities in F1 plants from certain crosses

10 As Paul Gepts of Gembloux begins to evaluate F2's from wide crosses and crosses to wild vulgaris types, I will become more involved in that activity

11 As time permits, I hope to resume evaluations of some materials treated with mutagenic agents, searching for additional variability for some of the character mentioned above

12 With H Schwartz and M S student, initiate studies on inheritance and relative stability of different reaction types for rust

STAFFING

Research assistant	1
Technicians	3
Field assistant	1
Labor helpers	9
Secretary	0 5

(1 technician and 4 labor helpers are 100% time in crossing block - overall breeding activities) Average 2 or 3 labor helpers weakly from labor pool

Resource Allocation is on "questionnaire"

CIAT RESEARCH SECTION PROFILE

Title Bush Bean Breeding II

SHREE P SINGH

OBJECTIVES

1 Develop desirable bean germplasm (populations and advanced lines) adapted to relatively cool climates of the major target areas with primary emphasis on resistances to predominant diseases, e g anthracnose, angular leaf spot, Ascochyta, gray spot, etc

2 Improve the stability of performance of the desirable germplasm with respect to climatic (drought and heat) and edaphic factors (low phosphorus, high Al and Mn, etc)

3 Drastically (at least double or triple) improve the productivity/ yielding potential of bush beans emphasizing plant architecture and yield components for the major target areas

STRATEGIES

1 Evaluate and identify desirable genetic variability through SSDEBG and other nurseries/sources, and,

2 Develop and evaluate alternative breeding methods and adopt those most suitable for exploitation of available variation and compatible with existing facilities, screening techniques, etc

MAJOR THRUSTS

1 Preliminary observation/evaluation of 'G' materials of the GRU and assure continuous flow of those into the SSDEBG

2 First seed increase of all materials entering the VEF (SSDEBG)

3 Organization, preparation, and distribution of the EP nurseries to related Team Members and help process its results and make selection of entries for the IBYAN

4 Management and handling of all breeding nurseries (parental selection, crossing, screening, evaluation, and selection) of Bush Bean Breeding II

5 Help evaluate IBYAN and other international bush bean nurseries with other Team Members and national program scientists in the target areas

6 Assist in bean research and production activities of Ecuador

OPERATIONS

Staffing * Research associate (1)
Technicians (5)
Field assistant (1)
Labor helpers (4)
Secretary (0 5)

Resource Allocation Budget US$12 634 00

- CIAT Research, 10 ha (50%)
- Popayán 6 ha (30%)
- Patía - Cauca 2 ha (5%)
- Obonuco - Pasto 2 ha (5%)
- International travel (10%)

* It does not include 2-3 Labor Helpers, received each week from the Labor Pool

CIAT RESEARCH SECTION PROFILE

TITLE CLIMBING BEAN BREEDING AND AGRONOMY

J H C Davis

OBJECTIVES To breed climbing beans combining high yield potential with disease and pest multiple resistances, for small-farm associated cropping systems

STRATEGIES
1. To concentrate initially on genetic improvement of climbing beans for relay and associated cropping systems with maize in middle to highland altitude zones of the tropics of Latin América
2. To evaluate the relative efficiences of monoculture and associated systems and develop standard testing procedures for climbing bean breeding

MAJOR THRUSTS
1. To screen potential parental material in a wide range of locations and associated cropping systems
2. Crossing and early generation selection for disease and pest resistances, primarily anthracnose, BCMV, rust, powdery mildew, Empoasca, wide as well as specific adaptation to cropping systems and climates, high yield potential within the major commercial seed types
3. Backcrossing programmes for the introduction of specific major gene traits into important commercial varieties
4. International testing of selected bean genotypes in association with maize
5. Verification of technology in on-farm trials with ICA in E Antioquia (Colombia) and with CIMMYT/INIAP in Imbabura (Ecuador)

OPERATIONS

Staffing

Research Assistants (2), Technicians (1), Field Assistants (1), Labor Helpers (8), Secretary (0 5)

Resource allocation Budget (not incl permanent labor) $11 487-1978

- CIAT Research, 5 ha (50%)
- Other locations in Colombia, 4 ha (40%)
- International trials (10%)

PROFILES OF CIAT RESEARCH

Title Bean Agronomy (International Trials) O Voysest V

OBJECTIVES

To develop an international bean testing network allowing the simultaneous evaluation of improved strain and varieties of field beans for a broad range of tropical environments

STRATEGIES

1 Organize and carry out coordinated testing of field beans for specific purposes

2 Identify and increase elite materials for international testing

MAJOR THRUSTS

1 International testing of improved strains and varieties of beans in selected environments

2 Identification of elite materials from previous trials for testing in a broad range of environments

3 Maintenance of working germplasm

4 Evaluation of agronomic practices for weed control and water managment

OPERATIONS

a) Staffing
- Research assistant 2
- Technician 1
- Field Assistant 1
- Labor Helpers 6
- Secretary O 5

b) Budget 11,487 US dollars

c) Land
- CIAT Semester A 4 ha
  Semester B 4 ha
  Dry season (July) 2 ha
  Dry season (Dec) 2 ha
- Popayán O 5 ha per semester
- Dagua 1 5 ha per dry season

CIAT RESEARCH SECTION PROFILE

TITLE Bean Pathology - H F Schwartz

OBJECTIVES

I Develop reliable screening procedures to efficiently evaluate large field nurseries of germplasm and progeny to obtain adapted and high yielding materials with multiple disease resistance to complexes of plant pathogens

II Evaluate the practicality and applicability of different forms of resistance to major plant pathogens

III Coordinate International nurseries of materials with resistance or tolerance to specific plant pathogens Nurseries are exposed to different populations of a pathogen present in different countries to identify sources of wide resistance or tolerance and determine the range of pathogen variability

IV Train reliable collaborators and students to detect and work with various plant pathogens by studying at CIAT, distributing information on plant diseases to collaborators and visiting national programs throughout Latin America

STRATEGIES

1 Continue reconnaisance and survey of pathogens in bean target areas

2 Ascertain the prevalence and importance of specific pathogens in target areas, and potential yield losses which they may incite

3 Continue to develop practical control strategies, emphasis upon plant resistance

4 Develop techniques to identify sources of resistance, screen breeding progeny and study various aspects such as disease avoidance (plant architecture modification) to completement plant resistance

MAJOR THRUSTS

I Bacteriology

1 Common Bacterial Blight - IBBBN
- Screening procedures
- International Bean Bacterial Blight Nursery

(H F Schwartz)

II. Mycology (screening procedures)
1 Bean Rust - IBRN
2 Anthracnose
3 Angular Leaf Spot
4 Root Rots Fusarium, Rhizoctonia, Sclerotium, Pythium
5 Disease Observation Nurseries Gray Spot, Ascochyta, Powdery Mildew and Others

OPERATIONS/RESOURCES

Staffing 2 Research Assistants, 1 secretary, 3 technicians, 1 Field Assistant, 4 Labor Helpers

Buget (1978) $13,162

Land 4 ha in CIAT
10 ha in CIAT (collaboration with Breeding)
2 ha in Popayán
2 ha in Popayán (collaboration with Breeding)
1 ha in La Selva, Medellín (collaboration with Breeding)
1 ha in Obonuco, Pasto (collaboration with Breeding)

Time 1 Research (70%)
a Field - 80%
b Greenhouse and Laboratory - 20%
2 Training (10%)
3 Administration (20%)

CIAT RESEARCH SECTION PROFILE

TITLE Bean Common Mosaic Virus Screening

Objectives

To develop a reliable inoculation methodology for the screening of promising bean germplasm against bean common mosaic virus (BCMV)

Strategies

1 To produce a specific antiserum for positive detection and identification of BCMV in infected plants

2 To investigate the physico/chemical properties of the virus, plant suscepts, and inoculation techniques conducive to wide-spread infection of BCMV-susceptible materials

3 To develop an efficient procedure for mass inoculation of selected bean materials in the field and greenhouse

Major Projects

1 To screen segregating bean populations and families derived from parental crosses

2 To screen selected lines uniform for resistance reaction

3 To screen materials from national and international programs, and from special projects

4 To study the genetic interaction between Phaseolus vulgaris and BCMV

5 To form an antiserum bank for the identification of viral diseases of beans in Latin America, to facilitate the evaluation of bean selections for disease resistance, and to guarantee the production and distribution of clean seed at the national and international levels

Operations

Staffing	Research assistant (1), Technician I (1), Technician II (1), Technician III (1), Labor helpers (5), Secretary (0 5)	
Resource allocation	Budget (1978)	$10,670
	Land	3 ha at CIAT

PROFILES OF CIAT RESEARCH

Title Bean Entomology A v Schoonhoven

Objectives

To determine the magnitude of bean yield reduction in Latin America due to insects

To develop economical and ecological acceptable insect control to reduce these losses

Strategies

1 To identify, determine importance and distribution of mayor insect pests of beans

2 To identify genetic resistance to principal insect pests, magnify the resistance levels, if necessary and incorporate into improved varieties

3 To investigate other control measures (cultural, biological, and chemical) of insect pests which are economical and ecological acceptable

Major Thrusts

1 Develop varietal, cultural and biological control methods of leafhoppers, Empoasca kraemeri

2 Study biology, influence on yield and nitrogen fixation of Chrysomelid adults and larvae, principally Cerotoma fascialis and to a lesser extend Diabrotica balteata

3 Develop varietal resistance to mite species, mainly Tetranychus desertorum

4 Develop varietal, chemical and non-chemical control methods of stored grain insects, mainly Zabrotes subfasciatus

5 Develop varietal and other control methoas of important insect pests not occuring in Colombia with national program entomologist These are principally Epinotia aporema and Apion godmani

6 During field visits in bean growing areas, literature reviews and collaboration with national program entomologists continually evaluate and examine if established research priorities are correct

Operations

Staffing 1PDF, 2 research assistants,1 secretary, 3 tecnicians, 9 laborers

Resource allocation budget (not including personel costs, but including temporary and overtime cost) $ 15 085 (1978)

Land aprox 4 ha at CIAT
small lots in Quilichao and/or farmers fields

Facilities laboratory (shared with cassava and beef entomology) storage room, ventilated pesticide storage area (shared with bean pathology)

Remarcks Principal planting seasons are June and December, thus is at the onset of the dry season to profit from maximal insect populations

PROFILES OF CIAT RESEARCH

Title Bean Physiology D P Laing

Objectives

To study the physiological constraints to yield and adaptation of Phaseolus beans in the tropics and subtropics with specific reference to the cropping systems of Latin America To aid in the development of new materials suitable for these systems

Strategies

I Identify environmental and physiological constraints to yield and adaptation in the target area.

II Evaluate Phaseolus spp germplasm with respect to these constraints through direct observation in experiments at CIAT and elsewhere and through evaluation of data from international nurseries.

III Recommend to the plant breeders in CIAT specific plant types which will be the most appropriate target for selection for the bean cropping systems in Latin America.

Major Thrusts

I Identify environmental and physiological constraints to yield and adaptation through reconnaisance of bean growing areas, literature survey and an agroecological survey of bean production zones

II Identification of physiological constraints to yield in field experiments at CIAT analysis of growth and development experiments of representatives of the CIAT growth habits and crop manipulation experiments using treatments which modify the normal growth and development

III Identification of physiological constraints to adaptation and the development of screening methods for comoonents of adaptation i.e water stress resistance, excess water resistarce, wide temperature tolerance, growth habit stability, photoperiod response, (seedling vigor and associated seed physiology screening are included in this section), experiments at CIAT and four other locations in Colombia

IV Development of the ideotype concept in colaboration with the breeders, with

specific types designed to fill the needs of the existing and possible new cropping systems for *Phaseolus* in the target area

Operations

Staffing Research Assistants (2), Tecnicos (5), Obreros (9), Secretary (0.5)
Resource allocation Budget (not inc. permanent labor) $17 761 (1978)
Land Approx 2-3 ha CIAT, 2-3 ha outside CIAT.
Facilities One field laboratory (8m x 30m) and small office in the Monasterio.

CIAT RESEARCH SECTION

TITLE — CLIMATOLOGICAL AND AGRONOMIC DATA MANAGEMENT AND ANALYSIS FOR BEAN GROWING REGIONS

Peter G Jones

OBJECTIVES — To provide integrated data management and analysis capabilities for the bean program to service questions posed by team members on

a) Research or breeding goal oriented topics,

b) Product orientation and dispersal topics

STRATEGIES

1 Development of basic data management tools

a) Climatological information retrieval system - (SAMMDATA)

b) General free format information retrieval system for Agronomic and Regional information (INFOL)

2 Collection, classification and cleaning of data

3 Development of Data Interpretation algorithms

a) Investigation of appropriate techniques

b) Implementation of software

4 Interrogation

MAJOR THRUSTS

1 a) Develop a task specific, space conserving, data retrieval system for agronomically useful climatic data "SAMMDATA"

b) Implement a free format information retrieval system for management of agronomic and regional information Since no IBM software is available - translate "INFOL" from CDC fortran

2 a) Collection of climatic data, data cleaning and storing in SAMMDATA files

b) Collection of agronomic and regional data, data classification cleaning and preliminary evaluation for usefulness and reliability

3 a) Development of phenology predicting algorithms and comparison of the results with current CIAT screening techniques

Development of water balance and crop yield predicting algorithms

b) Implementation of above to interface with climatic and agronomic data files

Development of display and report precessing algorithms

4 Utilization of the results of above to provide quantitative answers to questions on bean agronomy, distribution, breeding or potential dispersal

OPERATIONS	Staffing	Assistant (1)
	Budget	Nil
	Land/facilities	Nil

CIAT PESEARCH SECTION PROFILE

BEAN MICROBIOLOGY

P H GRAHAM

OBJECTIVE To produce compatible associations of bean cultivars and Rhizobium capable of satisfying the nitrogen requirements of beans under field conditions

STRATEGIES 1 To collect and evaluate Rhizobium strains for efficiency in fixation with P vulgaris

2 To evaluate N_2 fixation in agronomically acceptable bean cultivars and breed for enhanced fixation

3 To study and resolve agronomic considerations (density, association with maize, pesticide usage) likely to limit fixation under field conditions

MAJOR THRUSTS

1 Strain testing of isolates under both laboratory and field conditions

2 Evaluation of promising materials, progenies and advanced lines for efficiency in fixation

3 Development of research methodologies for effective breeding programs on nitrogen fixation

4 Evaluation of inoculation response and problems under small farm conditions (Carmen de Viboral, Huila, Ecuador y El Salvador)

MAJOR THRUSTS

5 Evaluation of agronomic practises likely to affect the inoculation response

6 Study of competition problems between supplied inoculants and native soil rhizobia

7 Evaluation of current inoculation practises

OPERATIONS

Staffing

Research Assistants (2) , Technicians (3)
Field Assistant (1), Laborers (5), Secretary (0 5)

Resource Allocation Budget (not including permanent labor) $17097 - 1978
CIAT land allocation ---
Other locations in Colombia 3 ha
International Trials 10%

PROFILES OF CIAT RESEARCH

OCTOBER - 1978

Title BEAN ECONOMICS - JOHN H SANDERS

Objectives Evaluate the economic factors relevant to the Bean Program strategies and research design with emphasis on the farm testing of new technology

Strategies

I With Bean Agronomy and National Institutions implement farm level testing of potential new bean technology

II Collaborate with other program scientists on the economic aspects of their experimental research

III Undertake macro-economic studies on bean production in Latin America and certain specific sub-regions to evaluate the tendencies in bean production and identify technical or economic constraints to the introduction of new bean technology

IV With other program scientists work with national institutions in on-farm testing of new technology and other economic issues associated with research design

Major Thrusts

I Develop an effective methodology for farm level testing of new technology by implementing a system in the principal production zones of Colombia

II Expand this farm level testing work to other countries principally in Central America

III Continue the data gathering and analysis of key indicators of bean production trends and constraints to productivity increase in Latin America

Operations Staffing Research Assistants (3),
Visiting Research Associate (1)
Data Processers (2),
Secretary (1)

3 CASSAVA PROGRAM

CIAT RESEARCH SECTION PROFILE

TITLE Cassava Agronomy - A Castro/D Leihner
(Cultural Practices/International Cooperation)

OBJECTIVES Integrate improved cassava technology into cassava production systems

STRATEGIES
1 Identify and evaluate management and environmental constraints to increased production of cassava in the lowland tropics
2 Design improved technology and management practices (emphasizing minimal external inputs) for optimized production under environments and production systems in CIAT's target areas

MAJOR THRUSTS

I Identifying and evaluating management and environmental constraints to cassava production (10% of activities)

II Developing Improved Management Practices for Cassava in the lowland tropics (90% of activities)
1 Plant phenotypes x plant populations x plant nutrients
2 Planting Pattern x Plant Phenotype
3 Systematics -Trapezoidal Plant Population/Spatial arrangements
4 Planting Methods (stake size and position)
5 Selection of Planting Materials diseased vs non-diseased, size, location
6 Optimum Plot Size determine optimum harvest sample size
7 Planting Time vs Age of Harvest plant every 2 months and harvest at 7 and 12 months
8 Systematic Fertilizers Experiments (similar to RH) P and K at different levels

OPERATIONS Staffing (for ACM and DL) 2 Res Assist , 0 5 secretary, 1 field assist , 3 laborers (2 in Carimagua and 1 in Quilichao)

Allocation of Resources
- Primarily research (55%)
- Major research done in the field (100%)
- Location primarily in Palmira
- Major research activities Developing improved management practices for cassava in the tropics (90%)
- Travel 25%

CIAT RESEARCH SECTION PROFILE

Title Cassava - Cultural Practices - D Leihner

OBJECTIVES

To improve the production and utilization of the best available genotypes in the lowland tropics and subtropics

STRATEGIES

1 - Identify and qualify management constraints to the increased production and use of cassava in the different environments where grown and adapted

2 - Develop, adapt and test methodologies for improved crop production under previously identified environmental and management constraints

MAJOR THRUSTS

I - Identify and qualify management X environmental constraints (10% of activities)

1 Reconnaisance travel in major growing areas of cassava
2 Communication with colleagues and collaborators, review of literature
3 Experimentation will include established practices to quantify advantages of improved technology (if any).

II - Determire Improved Methodologies for Study of cassava Cultural Practices (10%).

1 Harvesting techniques
- testing of various machines
simple blade (CIAT designed)
Australian cassava - harvester (RICHTER)
other designs
compare with hand methods

2 Planting systems for mechanized harvesting
- compare planting methods and densities
- evaluate efficiency and quality of work, comparing manual and mechanical systems

III.- Develop Improved Management Technologies for Cassava (80%

1 Harvesting techniques (as under II 1)
2 Intercropping with grain legumes

- evaluate effects of beans on total productivities of both crops in various associations and sequences, involving bush beans and climbing beans
- Determine weed control advantages of associated cropping
- Assess the pests and diseases aspects of various cassava/beans
- Associations and sequences
- Extend cassava-grain legume research to acid, infertile soil conditions through identification of adopted legume species and elaboration of cassava-legume intercropping systems for these conditions

IV - Weed control in cassava

- evaluate new herbicides in respect to their efficiency of control and selectivity in cassava (CIAT)
- study selected herbicides in different soils and climatic conditions (CIAT, Caribia, Santander, other)
- compare with standard = Karmex = 1 kg , and Lasso = 3 l (incompatible with legumes)
- evaluate legume compatible herbicides (Afalon, treflan and others) when associated with beans
- establish safe, effective and economic weed control systems

V - Studies of adaptation mechanisms in cassava (it has not been initiated due to lack of cooperation from hosting countries).

- evaluate four contrasting genotypes in four different latitudes
- Genotypes
  - A = non-vigorous, non-photoperiod sensitive
  - B = non-vigorous, photoperiod sensitive
  - C = vigorous, photoperiod insensitive
  - D = vigorous, photoperiod sensitive
- Latitudes
  - CIAT at 3°27' North
  - Alajuela (near San José) = 10°North lat
  - Cardenas (So Mexico) = 17°North lat
  - Culiacan (NW Mexico) = 25°North lat
- parameters
  - climatic data
  - soils information
  - plant growth/yields
  - (i) germination
  - (ii) leaf areas, numbers
  - (iii) branching
  - (iv) yields and drymatter accumulation
  - (v) cumulation growth rate (2 mo intervals)
  - Qualities of roots sp gravity, starch, etc

- Stages = 2
  first identify four genotypes (from 20)
  multiply and organize trials
- four planting dates (on solstices)

VI - Germplasm bank - multiplication
(will be accomplished by end of 1978, and responsabilities will be handed over to Clair Hershey, new cassava staff for genetic resources management)

OPERATIONS

Staffing 1 res assist , 0 5 secretary, 1 technician, 5 permanent laborers, 1 temporary

Allocation of Resources

- primarily in research (70%)
- major research done in the field (80%)
- Locations Palmira 40%, Quilichao 30%, Caribia (North Coast) 30%
- Major research activities
  Develop improved management technologies for cassava (80%)
- Travel 20% of time

CIAT RESEARCH SECTION PROFILE

TITLE Plant Nutrition (Cassava) R Howeler

OBJECTIVES To define and control the plant nutrition constraints of cassava under the broad range of soil conditions in the lowland tropics of Latin America

STRATEGIES
1 Selection of genetic materials tolerant of unfavorable soil conditions in the lowland tropical target areas
2 Determine the most effective and economic methods of applying plant nutrients
   a) Use of inexpensive nutrient sources
   b) Methods and times of application

RESEARCH THRUSTS

I Screening of tolerant genetic materials (30% activities)
   1 Al toxicity tolerance)
   2 Phosphorus deficiency tolerance) greenhouse & at Carimagua

II Fertilizer applications for Cassava (50% of activities)
   1 Cassava fertilizer studies at Carimagua N - P - K Ca - S - Zn
   2 Evaluate critical levels of nutrients at Palmira - field and greenhouse, plant tissues
   3 Erosion control in cassava
      a) Mixed cropping with cassava
      b) Legumes cowpeas, beans, Desmodium, velvet beans, others

OPERATIONS Staffing 3 res assist , 0 5 secretary, 2 technicians, 2 field assistants, 8 laborers

Allocation of Resources
- Primarily in Research 60%
- Major research done in the field (70%)
- Location Carimagua (primarily) (40%)
- Major research activities
  Fertilizer application for cassava/beans (50%)
- Travel 10% time

CIAT RESEARCH SECTION PROFILE

TITLE Cassava Agronomy - J C Toro

OBJECTIVES To evaluate varietal performance of improved cassava strains and varieties under low input technology in tropical regions of Latin America

STRATEGIES
1. Multiplication of elite germplasm identified by the cassava breeder
2. Formation of trials as defined by requirements and environments
3. Solicit cooperation of national agencies and independent growers in cassava growing regions
4. Participate in demonstrations, training and consultation of cassava investigators and producers (outreach)

MAJOR THRUSTS

I Multiplication of Elite Germplasm produce sufficient materials for other sections, about 10 ha at CIAT-Palmira (15%)

II Organization of Regional Trials cooperate with national agencies at up to 12 locations including both regional varieties and hybrids

OPERATIONS Staffing 2 Res Assist , 0 5 Secretary, 2 technicians, 9 permanent laborers, 2 temporary

Allocation of Resources
- Primarily outreach = 45%
- Major research done in the field (90%)
- Location Regional trials (70%) (primarily)
- Major research activities
  Organization of regional trials (80%)
- Travel 30% time
- Land 20-25 ha, half at CIAT-Palmira

CIAT RESEARCH SECTION PROFILE

TITLE Cassava Breeding - K Kawano

OBJECTIVES Genetically improve cassava for greater efficiency of carbohydrate production under a wide range of environmental conditions

STRATEGIES Evaluation of the potential and desirable characteristics in available genetic stocks and recombination of desired characteristics into new strains and cultivars

I Germplasm evaluation Yielding ability, harvest index primarily at Palmira

II Hybridization of selected progenitors
- 1 Materials selected original germplasm pens outstanding hybrids (increasing use of improved hybrids)
- 2 Utilizes between 300 to 500 progenitors, make up to 30,000 to 50,000 crosses annually
- 3 About 10,000 combinations distributed to cooperators

III Selection and evaluation
- 1 Produce and grow out a few to several hundred seeds per cross ($\pm$ 100 seeds each)
- 2 Procedure involves
  - a) Seedling field- transplanted from seedbed, select visually, then weigh to reduce numbers (25,000 to about 3,500)
  - b) Single row trials of six plants per genotype (select 3 plants) evaluate for height, root shape, HCN, starch, etc (20 characters), about 3000 entries Many experimentals go directly to Carimagua

MAJOR THRUSTS
1. Germplasm evaluation of yielding potential - primarily at Palmira
2. Hybridization of selected progenitors
3. Selection and evaluation of superior lines and genetic stocks at Palmira, Carimagua, and the North Coast

OPERATIONS Staffing Expert (1), Technicians (5), Field Assist (1), Labor helpers (10) Secretary (1)

Resource Allocation Budget (not including direct labor cost) US$15,115 00
- CIAT Research 30 ha (70%)
- Carimagua 3 ha (20%)
- North Coast 3 ha (10%)

CIAT RESEARCH SECTION PROFILE

TITLE Cassava Pathology - C Lozano

OBJECTIVES To alleviate effects of disease of cassava on its production in the lowland tropics

STRATEGIES
1 Determine major disease constraints to increasing cassava yields and production in the tropics
2 Ascertain the economic importance of diseases through quantification of losses according to source of disease on growin plants, planting materials, soil borne and post-harvest
3 Develop controls based on cultural practices, biological factors and host plant resistance

MAJOR THRUSTS
I Studies on the disease attacking the plant in the field CBB, superelongation, cercospora, leaf spots, frog-skin disease and Phoma leafspot
II Diseases related with planting materials clean seed fumigation, stake treatment
III Soil-Borne Diseases cultural and seed/stake treatment
IV Post-Harvest Problems studies on physiological and microbial aspects of post-harvest root deterioration

OPERATIONS Staffing 1 Res Assoc , 1 secretary, 4 technicians, 8 laborers

Allocation of Resources
- Primarily in Research = 60%
- Major research done in the field (65%)
- Location Primarily in Palmira (30%), Calcedonia (30%) Popayán (30%)
- Travel 5-10%

Land use CIAT-Palmira 1 5 ha , Calcedonia 1 ha , Airport (Palmaseca) 2 ha , Santander 2 ha , Popayán 2 ha , Quilcacé 2 ha

CIAT RESEARCH SECTION PROFILE

TITLE Cassava Entomology - A Bellotı/J A Reyes

OBJECTIVES To establish the major insect pest constraints and develop control methods to minimize economic damage, for cassava production with primary emphasis on the lowland tropics

STRATEGIES
1 Survey of major insect pests occurring on cassava in the important growing regions
2 Study insect/plant interrelations as they influence growth and productivity of cassava
3 Determine and develop effective, economic controls designed to minimize insect effects on growth and production

MAJOR THRUSTS

I Survey of the Major Insect Pests of Cassava (5% of activities)
- 1 Reconnaisance travel to ascertain insects pests on cassava - particularly of economic importance
- 2 Information sources literature, communication and workshops
- 3 Ordering of important pests Mites thrips horn-worms mealybug scale fruitfly stemborers

II Insect/Plant Interrelationships (30%)
- 1 Biology and ecology studies of insect pests of cassava population dynamics and biology of nine major pests of cassava
- 2 Biology of cassava insect biological controls especially Polistes wasps, Apanteles and Trichogramma spp , and Metarrhizium fungus of whitegrubs
- 3 Yield loss investigations - whitescale, hornworm, shootfly, mites, coffee bean, weavil and cigarrette beattle
- 4 Insect Damage on Planting Material - mainly scale and fruitfly

III Cassava Insect Control (65%)
- 1 Host plant resistance - fruitfly, whitefly, mealybug, scale, mites and thrips
- 2 Biological Control - white grubs (Metarrhizium fungus) and hornworms
- 3 Alternate controls attractants for control and studies of the cassava fruitfly (Armenia)
- 4 Pesticide Controls, stored cassava, stake treatment, white grubs, stemborers, mites and termites

OPERATIONS Staffing 1 Res Assoc , 2 Res Assist , 1 Secretary, 4 Technicians, 1 Field Assistants, 6 laborers

Allocation Resources

- Primarily research (80%)
- Major research done in the field (75%)
- Location Primarily Palmira (60%)
- Major research activities
  Cassava insect control (65%)
- Travel 5% time

Land Use CIAT-Palmira 4 - 5 ha , Caribia 2 ha, Guajira 1 ha , Ibagué 3 - 4 ha , Calcedonia 3 - 4 ha , Carimagua 1 - 2 ha

CASSAVA PHYSIOLOGY

Research Profile

James H Cock

Objectives

To determine means of increasing productivity of cassava under a range of ecological conditions in the lowland tropics

Strategy

a) Define ideal plant types for stress conditions

b) Determine methods of increasing yield potential

c) Understand basis of yield and growth pattern of the crop

Major efforts

1 Effects of water stress on growth and yield

2 Physiological basis of nutrient response

3 Effects of photosynthetic rate differences on growth rates and yield

4 Varietal differences (screening) for leaf life

Operations

1 Staffing 2RA, 1 Sec, 5 Tech, 8 labourers

2 Resources 60% CIAT, 40% Quilichao

CIAT RESEARCH SECTION PROFILE

TITLE Cassava Economics - J.K Lynam

OBJECTIVES

To provide an economic input into the design and evaluation of improved cassava technology so as to increase productivity, improve adoption, especially among resource-poor farmers, and contribute to an equitable distribution of benefits

STRATEGY

I Identify and measure the major constraints on yields of cassava in Latin America so as to determine priorites in the allocation of research resources

II Assess farm-level factors influencing adoption of cassava technology packages, especially profitability, risk and resource constraints

III Evaluate the expected (ex-ante) supply shift from the introduction of new cassava technology in Latin America and the resulting impact on markets for cassava and cassava products

IV Provide an ex-ante analysis of the (expected) impact of improved cassava technology on food production, income distribution, and farmer and consumer welfare in Latin America.

MAJOR THRUSTS

I. Development of a macro-data bank of cassava production, utilization, and prices, survey of micro-studies of cassava production systems, and continuing analysis of base-line survey of cassava production in Colombia.

II On-farm evaluation of CIAT cassava technology, leading to a determination of the edaphic and cultural factors influencing yields, constraints on adoption of the new technology, and the impact of new technology on farmer incomes

III Analysis of demand for cassava in Latin America and the potential for expanding cassava markets, also on analysis of market preferences for CIAT varieties

IV Development of a programming model to predict the supply of cassava in Colombia under both current and new technology

V Analysis of the adoption of CIAT varieties distributed at field days held during harvest of regional trials and the factor influencing adoption.

OPERATIONS

Staffing Research Associate (1), Research Assistant (1), Statistician (1),Technician (1), Secretary (1)

Resource Allocation Core Budget $

- CIAT Research 40%
- Field trials and surveys 60%

4 ASSOCIATED RESEARCH UNITS

PROFILES OF CIAT RESEARCH

RICE PROGRAM

TITLE	AGRONOMY J González
OBJECTIVES	To develop techniques of planting, cropping, harvesting, storing and benefits, to improve insects, weeds and diseases control that enable the increase and improvement of rice production in Latin America without cost increase.
STRATEGIES	Integrated cropping techniques are investigated by using economic commercial inputs, in order to increase the efficiency of production through out more crops per area per year
MAJOR THRUSTS	Planting distance is investigated in relation with water, pest and weed control and usage of nitrogen to increase yield and productivity.
OPERATION	
Staffing	One Research Associate, one Research Assistant, two Field Assistants and five Labour Helpers
Resource Allocation	US$ 10,000 without personal costs
Land/ Facilities	Seven hectares

PROFILES OF CIAT RESEARCH

TITLE	Rice Breeding H Weeraratne
OBJECTIVES	Development of high yielding varieties with acceptable grain quality for the reduction fo cost inputs and production stability
STRATEGIES	Breeding for resistance to major common biological constraints for production, namely, rice blast, hoja blanca and green leaf hopper
MAJOR THRUSTS	Over 90% of the program is devoted to breeding for blast resistance Multiple resistance, multilines and exploitation of minor genes for horizontal resistance are being pursued
OPERATIONS	
Staffing	Two research assistants, four technicians, one field assistant and eight labour helpers
Resource Allocation	Total operating budget - US$25,000 without personal costs
Land	6 hectares of land in CIAT and 2 hectares in Quilichao
Other Facilities	Rice quality evaluating laboratory in CIAT head house and green house under construction

CIAT RESEARCH SECTION PROFILE

TITLE International Rice Testing Program (IRTP) for Latin America - M J Rosero

OBJECTIVES

To develop and facilitate an international rice testing network for Latin America

STRATEGIES

1. Identification and needs of rice production in Latin America
2. Evaluate and multiply elite basic germplasm from IRRI, CIAT and national programs
3. Select entries suited and appropiate for testing in Latin America
4. Organize and distribute uniform nurseries for Latin America conditions and needs
5. Assemble and organize data for annual reports/conferences
6. Identify personnel for training at CIAT and IRRI

RESEARCH ACTIVITIES

I Identification of problems and needs in Latin America Rice production (15% of activities, all countries)

1. Travel throughout the target area and Asia
2. Surveillance of needs problems
   - soil problems
   - cropping systems irrigated, rainfed and upland
   - types and qualities of varieties grown
   - temperature requirements - both air and water
   - weed problems in different areas
   - diseases and pests

II Evaluation and multiplication of elite strains (40%, 3 ha)

1. Major sources IRRI and CIAT
2. Evaluate a set of IRTP nurseries from IRRI (12 x 100 lines)
3. Produce at least 5 kgs each (10 M2 each)
4. Identify superior, adapted materials for Latin America needs

III Organize uniform nurseries and trials for Latin America (30% , 2 ha)

1. Yield nurseries 35 varieties , 3 replications RCB

- medium varieties = 24 locations in Latin America
- upland varieties = 28 locations in Latin America

2 Observational nursery

- lowland and upland varieties 60 lines, 35 location in Latin America

3 Disease nurseries

- Sheath blight resistance 20 varieties, 3 replications - RCB, 11 locations in Latin America
- Blast resistance 185 lines, 33 locations in Latin America

4 Soil problems

- salinity/alkalinity nursery 25 varieties, 3 replications - RCB, 7 locations

5 Deep water varieties for yield 10 varieties, 2 replications - RCB, 6 locations

6 Distributed primarily in April/May and August/September

IV Reports (15%)

1 Deadline December for Abril/may
2 April and May deadline for August/September distribution

OPERATIONS

Staffing 2 Res Assist , 1 Secretary, 2 Field Assist , 7 permanent laborers,

Allocations of Resources

- Primarily in research (45%)
- Major research done in the field (60%)
- Location primarily at Palmira
- Major research activities
  Evaluation and multiplication of Elite strains (40%)
- Travel 25%

Land use

CIAT/Palmira 5 ha

CIAT RESEARCH SECTION PROFILE

TITLE Swine Nutrition/Biochemistry - G G Gómez

OBJECTIVES

To improve swine production in the lowland tropics of Latin America

STRATEGIES

1 Develop background information on the swine production industry in Latin America
2 Prepare proceedings on Workshop of Swine Production in Latin America
3 Develop a handbook for tropical swine production
4 Single-cell protein (cassava fermentation) under development Feeding trials with pigs postponed until 3000-liter fermentor will be actively used

RESEARCH ACTIVITIES

I Cassava fermentation (50% of activities)
1 Protein content of final dried-biomass standardized within a range of 33-37% CP
2 Fungal biomass as sole protein source for growing rats (18-20% CP diets) under evaluation
3 Use of 3000 l fermentor has been initiated to obtain enough quantity of fungal biomass for pigs feeding trial Evaluation with pigs will possibly start by July 78
4 Fermentations with 200-liter fermentor have used A fumigatus I-21A and ON-5
5 A stock culture of Cephalosporium eichorniae has been received from Dr K Gregory Initial trials with this fungus are planned for the second semester

II Cassava as a swine feed (25%)
1 Life-cycle feeding experiment with fresh cassava is in progress Experimental information needed to complement existent data on individual periods Selected gilts have initiated the pregestation period
2 Protein restriction for cassava meal-based diets with increasing levels of sugar cane molasses is in progress

III Leaf protein (10%)
1 Cassava leaf meal as a protein source for growing pigs is being evaluated

IV Cassava silage (15%)
1 Detailed experimental work is given by Dr J Buitrago

FUTURE

V Cassava roots with foliage silage for pigs

OPERATIONS

Staffing 1 research assoc , 1 res assist , 1 secretary, 4 technicians, 1 laborer

Allocation of resources

- Primarily - research during first semester 1978
- Major research done at the Swine Unit
- Location primarily at Palmira (100%)
- Major research activities
  - Cassava fermentation
  - Cassava as a swine feed
- Travel 10%

CIAT RESEARCH SECTION PROFILE

TITLE Swine Production - J Buitrago

OBJECTIVES

To develop a network of swine development centers and participate in capacitating professionals needed by them and search for alternative feedstuffs for swine in the lowland tropics of Latin America

STRATEGIES

1 Assembling information and becoming familiar with conditions of the major swine producing regions of Latin America
2 Making contacts with prime movers in swine producing areas of Latin America, offer capacitating training, building a network of consultation, fomenting the interchange of information and experience, and following up with technical support as needed
3 Coordinating research activities between countries and regions to aim at achieving cooperation between centers and CIAT towards effecting complementarity of efforts
4 In research attempting to "tie up loose ends" from previous studies involving alternative feedstuffs, like cassava, molasses, rice polishings and cottonseed meal

RESEARCH ACTIVITIES

I Investigations on Alternative Feed Sources for Swine (50% of activities)

1 Foliar protein - Forage crops like ramie, cassava leaves and kudzu may be dried and used in diets for pigs Poor palatability and low energy content limit their use in practical diets Research is needed to find solutions to these limitations
2 Cottonseed cake - toxic at moderate and high feeding concentrations Differences depending on locations and methods of processing
3 Molasses - cause diarrhea at levels above 5% at the outlet, later can increase to 30-35%
4 Cassava - fresh and ensiled cassava require separate feeding of protein supplement Different products may be used as source of protein according to location
5 Combinations of the above dietary sources

II Cassava silage (50%)

1 Fresh cassava is highly perishable and suffer severe rotting after a few days becoming unaceptable for human and animal feeding
2 Fresh cassava may be chipped and ensiled in sealed containers, does not require additives
3 Silage is relished and keeps very well with only 3-5% wastage The product is ready in a few days and can be used up to 1 year old as animal feed Some water loss with up to 5% dry matter
4 Pigs consume silage but need supplementation of protein

(J Buitrago)

OPERATIONS

Staffing 1 Res Associate, 1 Res Assist , 1 secretary, 1 laborer

Allocation of Resources

- Primarily training (50%)
- Major research done at the Swine Unit
- Location primarily at Palmira (80%)
- Major research activities
  Investigating alternative feed sources for swine (40%)
  Cassava silage (40%)
- Travel 20%

CIAT RESEARCH SECTION PROFILE

TITLE Plant Biochemistry – R A Luse

OBJECTIVES Coordinate and implement the activities of the Germplasm Resources Unit, and carry out biochemical research in support CIAT's commodity programs

STRATEGIES
1 Develop and manage the Germplasm Resource Unit
2 Specific problem solving based on appropriate biochemical procedures and simplied mechanical/physical methods

MAJOR THRUSTS

I Evaluation of Nutritive Qualities in Phaseolus Beans
- 1 Adoption of new techniques for SAA's (GLC+formic acid)
- 2 Evaluation of protein quality and content
- 3 Assays of metabolic inhibitors
- 4 Cooking times and extrusion processes

II Investigating Soil Toxicities for Beans
- 1 Carry out bioassays of problem soils
- 2 Develop controls for toxicities as appropriate to the needs of this station

OPERATIONS Staffing 1 secretary

Allocation of Resources

- Divided into Research (50%) and Administration (50%)
- Major research done at the lab (90%)
- Location Primarily at Palmira
- Major research activities
  Investigating soil toxicities for beans (75%)
- Travel 5% of time

CIAT RESEARCH SECTION PROFILE

TITLE Germplasm Specialist (Genetics) - L P Song

OBJECTIVES Assembling, maintaining, evaluating, and distributing basic germplasm of CIAT's major seed propagated commodities

STRATEGIES
1 Assembling and maintaining inclusive germplasm collections of CIAT's major commodities
2 Evaluating and cataloguing the genetic diversity within germplasm collections of CIAT's major commodities
3 Identifying important traits and combinations of genetic characters and supplying basic stocks

MAJOR THRUSTS

I Assemble and maintain germplasm collections (20% of activities)
- 1 Augmenting germplasm from external sources
- 2 Information storage and retrieval on seed stocks
- 3 Increasing and purifying seeds for storage and distribution

II Evaluating and cataloguing the genetic diversity (70%)
- 1 Characterization of genetic materials
  - Beans divided into 4 cultivated groups
  - Tropical forages (with R Schultze-Kraft)
  - Cassava (Germplasm Physiologist)
  - Other species (primarily storage)
- 2 Application of analysis techniques (multivariate analysis)
  - To be applied to beans first
  - Forages - guide collecting activities and objectives
  - Cassava - clustering can be applied directly
- 3 Cataloguing of descriptors for individual collections
  - Printed catalog from computer stored information
  - Computer storage/retrieval of information
  - Seed inventory file for three major commodities
- 4 Development and maintenance of an herbarium
- 5 Identification of new characters and specified combinations of genetic characters

III Distribution of Information and materials (10%)
- 1 Information-computer retrieval of stored data
- 2 Genetic stocks - character identification, supply of germplasm

(L P Song)

OPERATIONS

Staffing 2 Research Assist , 1 Res Assoc , 0 3 secretary, 3 technicians, 2 temporary laborers, 4 permanent laborers

Allocation of Resources

- Primarily Research (95%)
- Major research done in the lab (80%)
- Location Palmira, Popayán
- Major research activities
  Evaluating and cataloguing the Genetic Diversity
- Travel 5%

CIAT RESEARCH SECTION PROFILE

TITLE Plant Physiology (Tissue Culture) - W M Roca

OBJECTIVES

Use of tissue culture methods for the propagation, maintenance and international transfer of CIAT's vegetatively propogated germplasm The work will concentrate first on cassava

STRATEGIES

1 Develop tissue culture methods for the eradication of diseases in a routine fashion

2 Develop tissue culture methods for

a Rapid multiplication of valuable cassava germplasm, as part of a practical scheme on "seed" production and distribution

b Maintenance or storage of cassava germplasm in clonal form, for long periods of time, in small space and free of diseases

c International transfer of disease-free germplasm in clonal form, from CIAT to other Country's National Programs

MAJOR THRUSTS

I Disease eradication (25% of activities)

1 Develop therapeutic (heat, cold, etc) procedures, prior to meristem culture, for cassava clones infected with viral type diseases

2 Improvement and application of meristem and shoot tip culture techniques for disease eradication

3 Adaptation of methods (e g indicator hosts, serology, etc) to test disease eradication Collaborate with Virologist

II Propagation of disease-free cassava germplasm (30%)

1 Develop fast (multiple shoot type) *in vitro* propagation methods Collaborate with Birmingham (ODM Grant)

2 Develop practical links between *in vitro* and more conventional, greenhouse, propagation methods

3 Field trials of propagating material

III Maintenance of disease-free cassava germplasm (25%)

1 Develop "minimum growth" storage methods of meristem/shoot tip cultures (optimal transfer periodicity, recovery and multiplication, etc) Collaborate with Birmingham (ODM Grant)

2 Build up a collection of *in vitro* cultures of cassava germplasm

3 Develop liquid N_2 storage methods of cassava meristem/shoot tip cultures Collaborate with Saskatoon (Kartha, Gamborg)

4 Test genotype stability of stored material

IV International transfer of disease-free cassava germplasm (15%)

1 Develop simple meristem/shoot tip culture procedures for the exportation of valuable clones

2 Set up simple handling methods (recovery and propagation of plants) at the receiving end (National Programs)

V Other tissue culture methods (lower priority) (5%)

Develop new areas of research and application in the field of cell and protoplast, anther and pollen culture and explore their potential for the improvement of the crop To this end, methods need first to be developed to reproducibly regenerate plants from cell and callus cultures through embryogenesis and/or direct organogenesis

OPERATIONS

Staffing 1 Research Assistant, 2 Technicians, 1 Field Assistant and 0 5 secretary to be hired in 1978, with additional technical staff in 1979

ALLOCATION OF RESOURCES

-- Primarily Research (95%)

-- Major research done in the lab (85%) and greenhouse (15%)

-- Location Palmira

-- Major research activities

- Develop tissue culture methods for cassava

-- Travel 5% time

CIAT RESEARCH SECTION PROFILE

CIMMYT/CIAT Andean Region Maize Unit

G Granados/J Barnett

OBJECTIVE To increase maize production in the Andean Region

STRATEGIES 1) Promote cooperation between disciplines within national programs and between national programs within the region

2 Aid national programs in the development of a strategy which will create a continuous flow of information from the research staff to the farmer and from the farmer back to the research staff

3 Introduction and testing of new varieties

4) Aid and advise national programs in specific problems

5) Training of technical staff in maize production technology

MAJOR TRENDS 1) Regional Workshops

2) Regional Varieties Trials

3) Development of Highland materials

4) On farm testing

5) In country training program (being developed)

6 Development of materials to meet soecific needs within the region

OPERATIONS 1 Staffing

Cali 2 Senior staff
1 Ingeniero Agrónomo
1 Secretary
2 Laborers assigned administratively
One used more or less full time, up to four used during peak labor periods

Quito — 1 br der for highland materials
2 Resource Allocations

CIAT — Approximately 2 ha /semester (average) plus approximately 2 000 m^2 a: Quilichao

Other — All on farm trials are handled through national programs As the number varies from cycle to cycle it is impossible to place a figure Presently on-farm trials total approximately 6 ha throughout the region (average sizes 600 m^2)
This figure will increase over the next few years